

30 Challenges of the Mississippi Delta



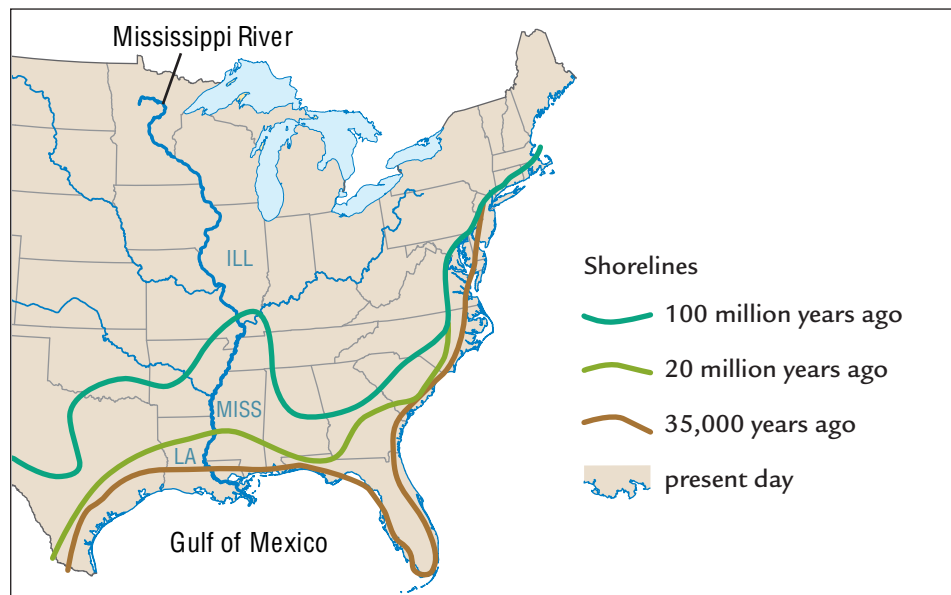
A delta is formed when a river slows down and deposits sediment as it flows into a lake or ocean. The largest delta in the United States is at the mouth of the Mississippi River. The Mississippi River Delta has an area of 3 million km² and the river continues to deposit over 300 metric tons of sediment per year.

The Mississippi Delta wasn't always so large. Over a period of millions of years, the Mississippi River carried and deposited sediment that eventually built up a huge fan-shaped delta. This ancient delta made up the land from southern Illinois to Louisiana and Mississippi, as shown below.

The city of New Orleans is built on land deposited by the Mississippi River and this location has resulted in many problems for the city. In 2005, the city was affected by a severe hurricane and flood that took about 1,000 lives. Although New Orleans is recovering from this destructive event, the future of the city continues to be uncertain because of the earth processes that shape the area.

CHALLENGE

How has the Mississippi River Delta challenged the people of New Orleans?



Changing Shoreline
of the Mississippi Delta

MATERIALS



For each student

- 1 Student Sheet 30.1, “Intra-act Discussion: Challenges of the Mississippi Delta”

PROCEDURE

1. Assign one of the following roles to each person in your group.
 - Teresa Corelli, interviewer for the Student Science Hour
 - Natalie Ludlow, ecologist
 - Dr. K.C. Sandoval, geologist at Boomtown University
 - Ethan Porter, engineer from Builders, Inc.
2. In your group, read the role-play aloud. As you read, think about what each character is saying.
3. Discuss what you think the people of New Orleans can do about the problems they face due to their location.
4. Mark whether you agree or disagree with the statements on Student Sheet 30.1, “Intra-act Discussion: Challenges of the Mississippi Delta.” Predict what you think other members of your group will say.
5. Discuss the statements with your group. Have each person share his or her opinion about each statement and explain why he or she agreed or disagreed.

NEW ORLEANS: AN UNCERTAIN FUTURE

Teresa: Welcome to the Student Science Hour. Today we have brought together a panel of experts who will help us explore some of the challenges facing New Orleans because of its location. What can be done to prevent another disaster? Panelists, please introduce yourselves and describe your background.

Dr. Sandoval: Hello, my name is K.C. Sandoval. I am a geology professor at Boomtown University. I study earth processes, such as erosion and deposition, in the Mississippi River Delta.

Ms. Ludlow: My name is Natalie Ludlow. I studied ecology when I was in college. Ecology looks at the relationships between organisms (including humans), and our environment. Some ecologists, like me, are inter-



Locator Map: Mississippi River and New Orleans

ested in understanding the relationship between the natural world and human activities. I use my ecology background to help politicians preserve the environment for the future.

Mr. Porter: And I'm Ethan Porter. I'm an engineer for a large construction company. My company works with the cities along the Mississippi River, building many of the large buildings, roads, and bridges in the area. My expertise is in flood control and in constructing safe structures on soft, wet ground.

Teresa: I'm glad that you could take the time to join us today. Now let's talk about New Orleans and the Mississippi Delta. Dr. Sandoval, I understand that many scientists had warned that New Orleans was in danger.

Dr. Sandoval: Yes, that's right. Its location puts it at great risk. To understand this, you must first understand how the land in southern Louisiana was formed. The powerful Mississippi River erodes many tons of soil every year. When the rapidly flowing river hits the Gulf of Mexico, it slows down and deposits the small bits of dirt and soil that it has been carrying at the mouth of the river. Over thousands of years, these sediments built up until they rose slightly above the level of the water. New Orleans was built on the loose soil of the delta.

Teresa: Mr. Porter, why was the city built on such an unstable place?

Mr. Porter: New Orleans was built on the banks of the Mississippi River because the river was used to ship products between the central United States and the Gulf of Mexico. It has not always been located below sea level. Until one hundred years ago, construction was limited to a more stable area on the naturally higher ground along the river. Much of the rest of the delta at that time was a marshy floodplain that was wet and frequently flooded.



Teresa: How can parts of New Orleans be located below sea level, but not be under water?

After Hurricane Katrina passed through New Orleans in 2005, flood waters caused even more destruction and forced a complete evacuation of the city.

Mr. Porter: As New Orleans expanded, a system made up of levees, canals, and pumps was built to control the water. This system was built to hold back the river and drain the surrounding marsh, so New Orleans could grow. Because of this engineering, parts of the city were built 1 to 6 meters below sea level. The system keeps the land dry by controlling the path of the Mississippi and by removing extra water.

Teresa: Is that why Hurricane Katrina caused such a severe flood in 2005?

Mr. Porter: That is part of it. The levees that held the water back failed in the storm. Very quickly afterwards, water flooded the city and destroyed houses, roads and the pump system itself. Unfortunately, about 1,000 people lost their lives, while many more New Orleans residents lost their homes or jobs.

Teresa: Ms. Ludlow, can you tell us how building a city on the delta can affect the environment?

Ms. Ludlow: When New Orleans expanded onto the delta, the surrounding marsh was drained. It may be good for the city in the short term, but removing a marsh, which is a kind of wetlands, can be a disaster for the environment. It damages plants and animals that can only live in that kind of environment, or habitat. Wetlands might not be attractive to people, but they provide food and homes for fish, shellfish, and birds.

Teresa: How was the ecology affected by the events from Hurricane Katrina?

Dr. Ludlow: It harmed the wildlife in the area and it's uncertain how long it will take to recover. For example, habitat changes can damage fish and shellfish populations. This in turn can harm the birds that depend on fish and shellfish for food. In addition, flooded land can become contaminated with sewage and oil carried by the floodwaters.

Teresa: Dr. Sandoval, as New Orleans rebuilds, what are the problems that the city will face?

Dr. Sandoval: Of course, there is always the threat that they will be hit with another large hurricane. But in addition, there are problems that are the result of efforts to control the Mississippi River.

Teresa: You mean there is more to the story than just removing the water?

Dr. Sandoval: That's right. The natural processes in the area are disrupted by the city. This is because the sediments that would usually be deposited in the New Orleans area are not allowed to be deposited there. Instead, the river is controlled and the sediments are carried farther downstream to the mouth of the river. So, the land in the New Orleans area is not built back up with fresh sediments.

Teresa: This must be related to the sinking land in New Orleans.



Part of the Mississippi Delta seen from the air.

- Dr. Sandoval: Exactly. The land under the city has been sinking for quite a while. The land compresses as the water is removed, which causes it to slowly sink as the water is pumped away. Even before the flood, it was not uncommon to see large gaps and cracks under buildings in New Orleans.
- Teresa: Mr. Porter, is the water control system in New Orleans making the Delta smaller?
- Mr. Porter: Yes, it is. An unfortunate result of the water control system that moves water away from the city is that it prevents the water from depositing sediments. It's successful in keeping the city dry, but Dr. Sandoval is right in that controlling the river flow disrupts the natural balance of erosion and deposition in the area. All of the sediments are sent downstream to another location, while erosion continues to wash away the delta.
- Teresa: Ms. Ludlow, is the area near New Orleans the only place where the Mississippi Delta is shrinking?
- Ms. Ludlow: No, the entire state of Louisiana is losing its wetlands at an incredible rate. In the southern section of the Mississippi River, the delta is sinking and being washed away faster than it is being replaced.
- Teresa: Dr. Sandoval, I heard that the Mississippi River is trying to change its course. Is this true?
- Dr. Sandoval: Yes, that is true. When people built New Orleans and the surrounding area, they created buildings and roads around the natural channel of the river. But over time, the channel of any river will change as erosion and deposition continue. The Mississippi River is no exception. For the last 50 years, the river has been trying to travel a shorter path to the sea. This would take it away from New Orleans.
- Teresa: Dr. Porter, it seems like letting the Mississippi River change its channel would reduce the risk to the people of New Orleans. Isn't it a good idea to let nature win this battle?
- Mr. Porter: You're right that a change in the river channel would reduce the risk of flooding in the city of New Orleans. But it would destroy homes, roads, and other structures in its new channel. It would also be the end of the port of New Orleans. The economic impact of closing this port is tremendous, since it is one of the largest in the United States.
- Teresa: I have one last question for each of you. Recently the people of New Orleans suffered terribly. As the city is rebuilt, what do you think could be done to prevent another catastrophe like this?

Ms. Ludlow: I believe as much of the wetlands habitat as possible should be restored to the area. Not only will this help protect the wildlife, but it will also protect the area from flooding. Wetlands can protect an area from floods during storms by absorbing large amounts of water before it reaches the city. Without the wetlands located between New Orleans and the Mississippi River, the city is more likely to flood again.

Mr. Porter: In the future we must focus on maintaining the safety of the large population of New Orleans. We have the technology to protect ourselves from even the worst disasters. It is a question of having enough money to build what we need to keep people safe. I believe that the answer is to do a better job of controlling the water in the future.

Dr. Sandoval: Flooding will be an ongoing problem in the future of the Mississippi Delta region. Having studied the effects of natural processes over a long period of time, I do not believe that controlling the river is good for the people of New Orleans in the long run. I believe that we should allow the river to change its course and that people should learn to work around nature, instead of bending nature to our needs. In the end, I think that nature will win anyway.

Teresa: Unfortunately we have run out of time for the Student Science Hour. Thank you all for joining us today.

ANALYSIS



1. Name three problems that the city of New Orleans faces as a result of its location on the banks of the Mississippi River.



2. How are erosion and deposition related to the problems that New Orleans has experienced?

3. Compare the situation of the Mississippi River in New Orleans to the Rolling River in Boomtown.

- a. List the similarities.
- b. List the differences.



EXTENSION

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